

I. *A Catoptric Microscope.* By Robert Barker, M. D. F. R. S.

**T**HOUGH *Microscopes*, compos'd of Refracting Glasses only, have been vastly improved, as to their Effects of magnifying; yet they have been attended with such great Inconveniences, that their Application to many Arts, in which they might be very convenient, is not so common as might be expected, and Mankind have reap'd but a small Part of the Advantage obtainable from so surprizing and useful an Instrument.

Among the Inconveniences mentioned, these are the most considerable :

1. That in order to magnify greatly, it's necessary the Object-Glass be a Portion of a very minute Sphere, whose *Focus* being very short, the Object must be brought exceeding near; it will therefore be shaded by the *Microscope*, and not visible by any other Light than what passes through itself; in this Case therefore, Opaque Objects will not be seen at all.

2. Objects illuminated this way, may be rather said to eclipse the Light, than to be truly seen, little more being exactly represented to the Eye, than the Out-line; the Depressions and Elevations within the Out-line appearing like so many Lights and Shades, according to their different Degree of Thickness or Transparency; though the

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contrary happens in ordinary Vision, in which the Lights and Shades are produced by the different Exposure of the Surface of the Body to the incident Light.

3. Small Parts of large Objects cannot easily be applied to the *Microscope*, without being divided from their Wholes, which in the Case of Vivisection defeats the Experiment, the Part dying, and no more Motion being observed therein.

4. The *Focus* in the *Dioptric Microscope* being so very short, is exceeding nice, the least Deviation from it rendring Vision turbid; therefore a very small Part of an Irregular Object can be seen distinctly this way.

To remedy these Defects I have contrived a Microscope on the Model of the *Newtonian Telescope*, in which I have been greatly assisted by that excellent Workman, Mr. *Scarlet, jun.* I shall say nothing of the Effects of this Instrument, excepting that it magnifies from the Distance of 9 to 24 Inches, having the Honour of shewing this Instrument to this learned Society.

### *Explanation of the Figures.*

*Fig. 1.* The entire Microscope mounted on its Pedestal, on a proper Joint, contrived so as to direct the Instrument, towards any Object.

*Fig. 2.* The Section of the Instrument, in which AB is the larger concave metalline *Speculum*, CD the lesser Concave metalline *Speculum*; EF a hollow Brass Screw to fasten in the 1st Dioptrical Glass, or Plano

Plano-convex Lens ; G H another Screw fastening on the hollow Cylinder E F I K (in which the Dioptric Glasses are contain'd) to the Body of the Microscope ; I K a Cap with a small Perforation, serving as an Aperture to the Eye-Glass, or 2d Lens (convex on both Sides) ; M L is a long Screw passing through the Nuts P and V, serving to bring the small *Speculum* to a proper Distance from the larger ; N Q a sliding Piece mov'd by the Screw, carrying the Stem Q R, and little *Speculum* C D ; Y X a Screw for the Cap at *Fig. 3* ; that at *Fig. 4*, is to be screwed on the Aperture I K.

*Fig. 5.* Shews the Construction of the Microscope, in which *i* is an Object supposed erect ; from which Rays falling on the *Speculum a b*, will be reflected to the *Focus k*, where they will form an inverted Image, and being reflected by the small *Speculum c d*, they will pass through the Perforation of the great *Speculum*, and falling on the Plano-convex Glass *e f*, converge again, and form an erect Image at *l* ; which being brought very near to the Eye, and so considerably magnified, will be distinctly seen through the Eye-Glass *g h*.

